Intelligent Control and Automation, 2026, 17(4), 270-298
https://www.scirp.org/journal/ica
ISSN Online: 2153-0661
ISSN Print: 2153-0653

Artificial Intelligence (A.I). vs A.L. (Autolligence) and the Remix of Creativity: A Critical Genealogy of Cognitive Architectures in Education

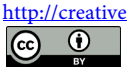
Chourdakis Antonis, Kounalakis Manolis

Department of Primary Education, University of Crete, Rethymnon, Greece
Email: chourdaa@uoc.gr, mkounalakis@edc.uoc.gr

How to cite this paper: Antonis, C. and Manolis, K. (2026) Artificial Intelligence (A.I). vs A.L. (Autolligence) and the Remix of Creativity: A Critical Genealogy of Cognitive Architectures in Education. *Intelligent Control and Automation*, **17**, 270-298.
https://doi.org/10.4236/ica.2026.174013

Received: October 12, 2026
Accepted: November 9, 2026
Published: November 12, 2026

Copyright © 2026 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
http://creativecommons.org/licenses/by/4.0/



Open Access

Abstract

This article proposes autolligence (A.L.) as a counter-term to artificial intelligence (A.I.) in educational discourse. It develops a critical historical genealogy of creativity drawn from the history of education, tracing how the concept was constituted pedagogically and politically, from the school technologies of the nineteenth-century classroom, such as the blackboard and the textbook, to learning management systems (LMS) and generative AI, which are analyzed as cognitive architectures rather than neutral tools. The genealogy culminates in an examination of the epistemological rupture that this historical-political approach produces in cognitive psychology and in the educational technology (edtech) literature on creativity. Both treat creativity as a measurable, optimizable cognitive skill, detached from its historical, pedagogical, and political contexts. On our reading, this abstraction blurs the distinction between executive regulation of thought, a capacity of individual cognition, and institutional control of learners, a historically constituted arrangement, and invites the treatment of human metacognitive regulation as functionally analogous to algorithmic automation. Drawing on the extended mind and distributed cognition frameworks, and on research on cognitive offloading, the article argues that creativity within LMS and generative AI environments tends to be reduced to remix within pre-configured parameters. Autolligence names this systemic condition of educational automation, presenting AI not as a rupture but as an escalation of earlier logics of standardization, metrication, and surveillance. By shifting the focus from the "intelligence" of machines to the organization of learning, the concept situates creativity within the tradition of critico-praxical pedagogy.

Keywords

Autolligence, Artificial Intelligence, Creativity, History of Education, Critico-Praxical Pedagogy

1. Introduction

The discourse surrounding the intersection of education, technology, and creativity often remains fragmented across the fields of the philosophy of education, the cognitive sciences, and educational technology research. This fragmentation persists despite a growing consensus within the cognitive technologies literature that the field suffers from a lack of integration, necessitating cohesive conceptual frameworks and interdisciplinary collaboration [1]. Building on this premise, this article examines how the historical evolution of schooling and its contemporary technological infrastructures shape, expand, or constrain the philosophical nature of the mind and human creativity. This examination is based on the understanding that cognition does not develop in isolation but rather through dynamic engagement with social practices and institutional frameworks [2].

From this perspective, the history of schooling emerges not merely as a chronicle of social institutions but as a history of cognitive architectures. Consequently, a critique of contemporary educational technology calls for a genealogical analysis, revealing that learning management systems (LMS), algorithms, and generative AI systems are neither pedagogically nor politically neutral tools. Instead, they constitute infrastructures that reorganize labor, assessment, decision-making, and the fundamental conditions of thought, often subordinating human inquiry to the imperatives of efficiency, automation, and compliance.

In this context, the common thread of this paper is the critical historical genealogy of Artificial Intelligence coupled with its conceptual analysis. This methodological framework allows us to investigate whether institutional and digital infrastructures operate as engines of cognitive extension or, conversely, as mechanisms of "cognitive extraction" that weaken authentic learning, philosophical inquiry, and human creative processes. Given these considerations, there is a pressing need for a new conceptual framework that can effectively articulate—pedagogically, historically, and politically—the essential appropriation of the contemporary technological revolution.

Methodological Approach: Source Selection, Scope, and Criteria for Continuity and Discontinuity

This article is a conceptual-historical study. It does not claim to be a systematic review. Its method is a critical genealogy in the sense of problematizing categories that present themselves as natural, such as "creativity", "artificial intelligence", and "cognitive control", by tracing the conditions under which they were constituted [optional: Foucault, 1977]. The genealogy is therefore an interpretive argu-

ment built through purposive reading of secondary literature. It is not an empirical test of a causal lineage, and it does not claim exhaustive coverage.

Source selection: The argument draws on three bodies of scholarship, each supporting a different link in the genealogy. The first is the history of education and of the materiality of schooling, mostly peer-reviewed historical studies of specific technologies (the blackboard, classroom architecture, textbooks, wall charts, educational film, the financing of audio-visual aids) published chiefly in Paedagogica Historica and History of Education, together with established monographs. The second is cognitive psychology of creativity and the history and politics of the concept of creativity. The third is contemporary research on LMS, generative AI, cognitive offloading, and the extended-mind and distributed-cognition frameworks. Three criteria guided selection:

1) Sources had to be peer-reviewed or published by established academic presses. 2) They had to analyze technologies in terms of materiality, ideology, or cognition, rather than instructional efficacy alone. 3) For the contemporary corpus, priority went to recent work (2024-2026), because the field is changing rapidly. Preprints are used sparingly and identified as such.

Foundational theoretical works [3]-[7] serve as interpretive frameworks rather than as evidence.

Historical and geographical scope: The core of the genealogy is the nineteenth-century classroom, when mass schooling consolidated spatial, temporal, and material regulation. Early modern visual pedagogy is treated as a prehistory. The twentieth century is traced through the psychometric turn in creativity research, the Cold War, the tension between progressive and managerial reform, and large-scale assessment such as PISA. The endpoint is LMS and generative AI in the 2020s. Geographically, the sources concentrate on Europe (Germany, Sweden, Spain, Switzerland, Britain, Greece) and the United States. They include one colonial case, the Semarang exhibition of 1914 in the Dutch East Indies. The Greek context is used as a situated vantage point, not as a representative case. The genealogy is thus Euro-Atlantic in orientation, and its claims should not be generalized to educational systems elsewhere without further study.

Criteria for continuities and discontinuities: Because the article rejects the "traditional versus contemporary" dichotomy, the comparison between classroom technologies and digital systems needs criteria that do not depend on the technology's age or medium. Each technology was therefore read through five analytic questions, which follow the argument of Sections 2–4:

How does it organize knowledge (sequence, linearity, visibility)?

How does it distribute agency and authority (who selects, evaluates, and decides)?

What regimes of regulation, monitoring, and assessment does it enable?

What political or ideological function does it serve (national identity, classification, market-readiness)?

How does it condition the preconditions of creativity (experimentation, recom-

bination, tolerance for ambiguity, the single correct answer)?

A continuity is identified when the same function appears in a historical technology and in a digital system, and is documented in more than one study or context. A discontinuity is identified when a digital system exhibits a capacity with no documented historical analogue. The sources point to four such capacities:

1) individualization, in contrast to the blackboard's shared focal point;

2) real-time adaptivity and personalization;

3) the recursive incorporation of user outputs into the system ;

4) the delegation of higher-order cognition (synthesis, evaluation, creative production) to technical systems.

To separate intensification from rupture, we ask whether a new capacity amplifies the scale, speed, or granularity of functions 1–4 or alters the function itself. Where the evidence suggests change in kind, we report it as a limit of the continuity thesis rather than absorbing it.

Limitations: Accounts of the past are interpretations, and much of the evidence on generative AI and creativity is recent, correlational, and partly preprint-based. The critico-praxical standpoint is a declared commitment of the authors, not a neutral position. The genealogy should be read as a conceptual argument whose purpose is to reframe the question, not to settle it empirically.

2. Educational Technologies as Historical Cognitive Architectures

The configuration of the modern school during the nineteenth century was inextricably bound to the massification of education and to the imperative for the rational governance of expanded student populations through a cohesive matrix of spatial, temporal, and material regulations. The analytical lens of the "materiality of education" foregrounds school objects as objects that condense sociocultural relations. School artifacts—whether vernacular improvisations generated by actors within the educational milieu or industrially fabricated apparatuses—embody distinct pedagogical presuppositions and are embedded in broader economic and ideological processes [8].

The architectural choreography of the classroom (the frontal orientation of the blackboard, the parallel arrangement of students' desks, the elevated teacher's desk) constituted a specific staging of knowledge. Within this spatial architecture, the educator modulated the visibility and pace of the pedagogical process, enforcing forms of social interaction grounded in disciplinary regulation and panoptic surveillance [9]. Correspondingly, thematically specialized classrooms (such as the physics laboratory) circumscribed the boundaries of pedagogical praxis, giving knowledge either a hands-on, experimental character or a purely reproductive one, depending on the equipment available [10].

Sensory engagement was a key area in the consolidation of educational technologies, with vision becoming the sense these technologies harnessed most. The appropriation of the visual channel through instructional aids does not represent an innovation of mass education; as early as Apian's Cosmography (1524), visual

material functioned as a self-instructional medium via paper simulations of astronomical instruments, organizing sensory apprehension and schematizing abstract conceptual relations [11]. This tendency was further developed in the seventeenth century by Comenius's *Orbis Sensualium Pictus* (1658) [12].

An emblematic visual technology in the history of education is the blackboard. It did not operate merely as a neutral writing surface; rather, it constituted a shared visual field wherein knowledge was progressively structured and collectively monitored. As a result, knowledge assumed a linear, sequential, and public form, while its use reinforced practices of copying, repetition, and compliance, entrenching the centrality of the educator as the sole custodian of knowledge. Alongside its disciplinary dimension, however, the blackboard transformed knowledge into a public good accessible regardless of social origin, rallying the student community around a common focal point—in contrast to contemporary digital individualization—and promoting the ideal of universal access to learning [13] [14].

The examination of educational technologies is embedded in specific historico-political and ideological contexts, which this paper must foreground so that the new terminology it proposes for the conceptual study of Artificial Intelligence can be more clearly understood.

The process of visualization was closely linked to the formation of national identities, transmuting abstract political concepts into emotionally charged images through the medium of the school textbook [15]. At the same time, the visual representation of alterity and the "Other" functioned as a mechanism for legitimizing racial and social hierarchies. The emphasis on such representations reveals a dominant discourse of cultural othering (the definition of a group by others) that permeated education, rendering visualization an instrument for classification and the consolidation of power relations through the gaze [16].

Beyond textbooks, other visual technologies were mobilized toward this goal. Instructional wall charts turned school decoration into a teaching tool, whereas educational cinema—particularly during turbulent political periods—served national and ideological objectives by steering the student gaze. In these technologies, visualization actively constructs social meaning [17] [18].

In the Greek context, the study of primary education highlights the school as an institution of ideological framing, inextricably bound to prevailing sociopolitical structures [19]. A corresponding entanglement of technology and ideology is mirrored in the historical evolution of instructional methods. How technological media vary within a given method depends on political conflicts, regime changes, institutional priorities, and generational experiences. At the same time, these technologies become emotionally laden with collective expectations, enthusiasm, disillusionment, or ideological rejection [20].

Furthermore, educational policies are a particularly important field of investigation. A key focus of inquiry is the financing of educational technology, since public expenditure reflects the degree to which administrative bodies align with modernizing enthusiasm for novel technological apparatuses. Technological innovation does not automatically translate into classroom practice; rather, it pre-

supposes institutional funding, material infrastructure, administrative organization, and adequately trained teaching staff [21].

The curriculum, correspondingly, is approached as a "system of reason" in its historicity—that is, as a historically constituted matrix of rules dictating legitimate knowledge, its instructional sequencing, and its relationship to assessment. In this light, it operates as a technology of governance by orchestrating systematic causal relations between specific pedagogical practices and desired outcomes, thereby forging the intended configurations of subjectivity [22] [23].

All of the educational technologies discussed above, when interrogated in their historicity, bring to the fore the concept of cognitive architecture. As this article argues, this concept offers a synthetic analytical framework for approaching the history of educational technologies beyond the dichotomous divide separating "traditional" from "contemporary" media. It functions as a connective tissue linking the history of education, the findings of cognitive psychology, and the relevant educational technology (edtech) literature on creativity. Within this framework, the paper endeavors to construct a critical historical genealogy of cognitive architectures, focusing on the ways in which they either facilitate or constrain the creative capacities of learners.

Creativity thus transcends its narrowly individual psychological definition, emerging instead as a product of material and social conditions that presuppose experimentation, recombination, and tolerance for ambiguity. When school technology rigidly regulates bodily posture, the sequencing of operations, and the idea of a single correct answer, it severely restricts these preconditions. Nonetheless, material standardization does not invariably entail the undermining of creativity, since it can provide common tools, linguistic codes, and symbolic media that fuel the creative process. Media such as the blackboard, the map, or laboratory instruments serve as springboards for inquiry, provided they are not confined to the passive reproduction of pre-established responses. The crucial issue lies not in labeling a technology as "old" or "new", but in its structural relation to knowledge and the mode of student agency it embodies [24].

This distinction becomes particularly acute in the case of digital media and especially the screen. The comparison between print and digital media goes beyond the difference in their material form, reflecting divergent conceptions regarding the nature of learning, the organization of attention, and the constitution of educational experience. The historical examination of related theoretical inquiries reveals that proclamations championing screen-based learning frequently articulated heterogeneous and conflicting conceptualizations of the learning process itself [25].

3. Creativity: The Epistemological Rupture of the Psychological Approach

3.1. Cognitive Architecture of Creative Cognition: The Regulation of Thought and Its Limits

Within Cognitive Psychology, creativity is analyzed as a multi-component mental

process grounded in the synergy of divergent and convergent thinking, wherein the spontaneous generation of ideas is brought to completion through executive evaluation, selection, and functional transformation [26] [27]. Contemporary research no longer equates creativity with sudden inspiration, interpreting it instead as a sequence of associative mechanisms and executive functions governing targeted planning, interference inhibition, and solution optimization [28] [29]. Stored prior knowledge—semantic and episodic representations—constitutes the raw material flexibly reorganized to construct novel mental combinations [30]-[34].

At the cognitive level, the density and connectivity of semantic memory networks, coupled with verbal fluency, predict the quality and originality of responses, whereas working memory underpins the analytical demands of convergent processing [35] [36]. Even within classical divergent production tasks, performance integrates stages of executive evaluation [37] [38]. Executive functions (working memory, inhibition, cognitive flexibility) enable goal maintenance, the suppression of stereotypical responses, and shifting between mental sets [39] [40], while flexibility enhances divergent output and working memory/persistence supports convergent processing [41] [42] through the synergy of brain networks dedicated to cognitive control and spontaneous activity [43].

Therefore, the main conclusion of this cognitive approach is that creativity constitutes a dynamic, iterative alternation between flexibility and persistence, modulated by metacognitive control and the interplay between spontaneous and controlled thought. This finding dismantles the myth of pure spontaneity. For an output to be deemed creative, controlled cognition is required. Consequently, levels of spontaneity recede as the creative act submits itself to mechanisms of control, appraisal, and selection.

Two distinct senses of "control" must be analytically disentangled in this context. The executive regulation of thought designates intra-individual cognitive processes—specifically goal maintenance, the inhibition of prepotent responses, set-shifting, and metacognitive monitoring—traditionally examined within cognitive psychology. The institutional control of learners, by contrast, pertains to historically constituted configurations—such as curricula, assessment regimes, classroom topologies, and standardized testing—that govern what learners may enact, through which developmental trajectories, and with what sanctioned outcomes. The former constitutes a property of individual cognition, whereas the latter operates as a structural mechanism acting upon individuals. Although these dimensions remain conceptually discrete—and we do not contend that executive regulation is merely institutional control in disguise—they are nevertheless intrinsically coupled. Institutional framework conditions dictate which modalities of cognitive regulation are demanded, incentivized, and evaluated (for instance, the suppression of divergent thinking in favor of convergent accuracy), thereby reconfiguring the ambient conditions under which executive processes operate during creative tasks. The critique developed herein addresses precisely this systemic

coupling, an intersection that psychological paradigms of creative cognition systematically obscure by abstracting cognition from its socio-institutional context.

This raises the critical epistemological question that cognitive psychology cannot address: How is this "control" of thought constituted, where does it come from, and what interests does it serve? By framing executive regulation as a context-free, quantifiable trait, psychological accounts systematically leave its structural coupling with institutional control unexamined. Within our analytical framework, this abstraction renders executive regulation articulable through the lexicon of generation, evaluation, and selection—precisely the functional vocabulary employed by computational models of cognition and research on creativity-support tools to describe their underlying mechanisms. It is precisely this shared conceptual repertoire that prompts the treatment of human metacognitive regulation as functionally isomorphic to algorithmic automation. We emphasize that this formulation represents our critical reading of these paradigms, rather than an explicit position advanced by their respective authors.

Conversely, the counter-thesis of a critico-praxical pedagogical framework posits that the institutional control exerted over school-based creativity, together with the modalities of executive regulation it systematically rewards, are not neutral invariants of human cognition; rather, they emanate from the historical, pedagogical, and political contingency of the concept itself. This position does not negate the ontological existence of executive regulation as a psychological capacity. What it problematizes is its naturalization as a context-independent construct detached from the institutional matrices within which it is elicited and institutionalized.

3.2. The Historical, Pedagogical, and Political Constitution of Creativity: The Contingency of "Control"

The exclusive focus on cognitive variables has faced strong criticism for severing the creative act from the historical, sociopolitical, and material context of the school, redirecting educational inquiry toward ecosystemic and sociocultural approaches [44] [45]. Studies of the link between creativity and technology/AI overlook critical dimensions when they fail to assess whether educational technology treats creativity as detached from the historical-sociopolitical context of the school.

To understand how creativity is defined and regulated, it is essential to examine the historical context of its terminology. "Creativity" constitutes a historically unstable term with competing meanings, and its use within schooling has shifted across historical periods [46]. The historical genealogy of the term brings to the fore pre-existing notions (inventiveness, imagination, originality), while demonstrating that "creativity" became dominant in the latter half of the twentieth century, pivoting from theological-metaphysical conceptions toward a human, psychological, and educationally manageable capacity—a deeply political shift, since it determined which kinds of action deserved to be cultivated [47]-[49]. As an institution, the school historically inherited at least three traditions of this term:

the artistic (self-expression, divergent thinking), the scientific-Enlightenment (discovery, problem-solving), and the everyday/technical (experimentation, praxis), which generate different educational outcomes and sustain the polysemy of the term in everyday instructional praxis [50]. A pivotal turning point was the post-war period in the United States, where Guilford's (1950) presidential address transformed creativity into an object of empirical research, psychometric legitimization, and an objective of educational policy [48] [51].

At the same time, the concept is historically and pedagogically constituted through fields of tension. It entered the history of education to subserve pedagogical conditions such as standardization, discipline, rote memorization, and the normalization of mass education [52] [53]. In the early twentieth century, the progressive movement advocated for the child's creative potential and experiential learning as a counter to instructional formalism and automatism [54]. However, during the 1920s and 1930s, child-centered discourses coexisted with the rise of scientific measurement, standardized testing, and managerial control [55] [56]. These reforms were subsequently constrained by historical events such as the Second World War and the Cold War [57] [58].

Finally, creativity proves to be a politically constituted construct operating as a mechanism for producing subjectivities within "regimes of truth" [59]. It migrated from its progressive, humanist version of the 1960s [60] to the market-oriented, conservative version of the 1990s and 2000s, morphing into a resource for the "knowledge economy" [61]. During the Cold War, and especially post-Sputnik, it was coupled with giftedness, scientific supremacy, and national competitiveness as a bulwark against communism [62], and was later co-opted into neoliberal technologies of governance [63]. Although the term has spread into contemporary curricula—such as in England [47] [64] [65]—international evidence demonstrates that official emphasis is rarely accompanied by substantive pedagogical scaffolding [66].

As shown above, creativity can serve both emancipatory and authoritarian political agendas. However, when fused with innovation and entrepreneurship, it operates as a neoliberal discourse promoting deregulation and market-readiness, marginalizing critique, collectivity, and radical imagination. Policies such as the Melbourne Declaration (2008) and the PISA assessments instrumentalize the term in service of market rationalities [67].

In conclusion, the academic reception of creativity has been historically determined by Cognitive Psychology. Yet, viewed through the lens of a critico-praxical pedagogy, this purely psychological approach undergoes a profound epistemological rupture. It remains enmeshed in a de-historicized analysis, abstracting the creative act from the historical, material, pedagogical, and sociopolitical contexts wherein it is engendered, signified, and executed.

This epistemological self-enclosure of psychology becomes particularly evident in the present moment, wherein creativity is increasingly wedded to technology and Artificial Intelligence. By detaching creativity from its historical and institu-

tional roots, the psychological perspective fails to recognize the essential divide between human subjectivity and computational systems. AI systems fundamentally operate through what we term autolligence (see Section 5), relying on algorithmic computation, statistical analysis, and data processing, rather than possessing reflective consciousness. The psychological paradigm's de-historicization obscures this reality, mistakenly equating algorithmic automated processes with the historically and politically informed creative agency inherent to human thought.

4. Artificial Intelligence Tools as "Cognitive Architectures"

4.1. Introduction: From "Tool" to "Architecture"

The foundational argument of this section posits that contemporary Learning Management Systems (LMS) and generative AI applications transcend the status of mere conduits for content delivery, operating instead as fully fledged cognitive architectures. These are carefully designed environments that predetermine which cognitive operations are facilitated, which are obstructed, and which are systematically rendered invisible within the pedagogical workflow. The spatial metaphor of "architecture" is used deliberately. Much as the physical blueprint of a building channels the trajectories of its occupants without resorting to explicit prohibitions, an LMS or an AI tool establishes paths of least cognitive resistance while leaving the user's formal intellectual liberty ostensibly intact.

Crucially, the theoretical stakes of this inquiry extend far beyond the standard, polarized debates over educational technology integration, focusing instead on how these digital cognitive architectures affect the cognitive faculties indispensable to creativity. Eschewing simplistic binarisms of "harm versus benefit", the analysis seeks to trace the precise design parameters under which a given technology tips the scales toward one outcome or the other.

4.2. From the Extended Mind to Cognitive Offloading

The theoretical scaffolding of this section draws upon distributed cognition and the extended mind hypothesis, maintaining that cognitive processing is interactively distributed across individuals and their tools. As Clark and Chalmers [3] famously contend, an extended mind entails that the environment plays an active, constitutive role in cognitive operations proper, stretching the boundaries of thought well beyond the anatomical enclosure of skull and skin. This foundational premise rests on a tightly coupled human-environment system characterized by reciprocal causal loops, wherein external media are seamlessly co-opted into ongoing cognitive activity [68] [69].

Operating under this broad theoretical umbrella, distributed cognition shifts the analytical lens toward macro-systems of activity. Human interaction emerges as a multimodal phenomenon anchored in an intricate ecology of resources, where cognitive functions materialize as properties of the entire action system. Subjects operate within a cognitive ecosystem comprising physical artifacts, cul-

tural practices, and mental models. Simultaneously, both individual and institutional knowledge are shaped through the dynamic interaction between human agents and culturally embedded material tools. From this perspective, human cognition is fundamentally situated within material, social, and cultural contexts, co-constructed through continuous interactions among individuals, technologies, and public representations [70]. This framework also highlights the intrinsic historicity of knowledge production [71].

Learning Management Systems (LMS) and Generative AI (GenAI) platforms are prime examples of the strategic use of external systems to enhance mental computation. This development has brought the concept of cognitive offloading to the forefront of international debate, highlighting the use of external supports to reduce internal cognitive load during task execution [72]. The widespread expectation of immediate digital access—illustrated by the Google effect—encourages people to remember where information can be found rather than the information itself. The mere availability of an external cognitive resource actively reshapes internal cognitive strategies [73].

While cognitive offloading offers clear advantages—such as using a calculator to alleviate the burden of arithmetic—recent research has shifted focus toward the specific cognitive faculties being offloaded and the extent of conscious, subjective control maintained during this process [74]. Generative AI further expands the scope of offloading into higher-order cognitive domains, including synthesis, evaluation, and creative production. Entrusting these sophisticated functions to educational technologies raises significant concerns regarding cognitive autonomy, prompting critical questions about whether a student's output can still be considered a genuine personal achievement [75].

In this section and in Section 4.4 we distinguish three kinds of claims: correlational findings from observational studies, task-specific experimental effects, and theoretical predictions or conceptual frameworks. They do not carry equal evidential weight.

Recent scholarship delineates two distinct modalities of cognitive offloading: autonomous offloading, wherein individuals retain an active role in critically evaluating incoming information, and dependent offloading, wherein task execution is entirely delegated to technological systems. Parallel to this typology, the construct of cognitive surrender has been introduced to characterize the uncritical internalization of AI-generated outputs under minimal evaluative scrutiny [76]. Crucially, these constructs represent conceptual taxonomies, and the empirical evidence underpinning them remains heterogeneous in nature. Investigating these dynamics through a cross-sectional survey design (N = 666 valid responses from UK participants via convenience and purposive sampling), Gerlich [77] reports a strong negative correlation between the frequency of AI tool utilization and critical thinking scores ($r = -0.68$), a positive correlation between AI usage and cognitive offloading ($r = 0.72$), and a negative correlation between offloading and critical thinking ($r = -0.75$). In the author's mediation model, the total effect

of AI utilization on critical thinking was b = −0.42 (SE = 0.08, p < 0.001), with the indirect effect mediated through cognitive offloading yielding b = −0.25 (SE = 0.06, p < 0.001; approximate 95% CI [−0.37, −0.13], derived from the reported point estimate and standard error), while the direct effect remained statistically significant (b = −0.17, SE = 0.05, p < 0.01$). Cognitive offloading thus functions as a partial statistical mediator, accounting for approximately 60% of the total effect, with younger cohorts (aged 17 - 25) demonstrating higher rates of AI usage and offloading alongside lower critical thinking scores on a 23-item Likert instrument subject to self-report limitations and sampling bias.

However, such observational findings establish mere empirical association rather than directional causality or temporal change. Because cross-sectional architectures compare distinct individuals at a single juncture, they are methodologically incapable of demonstrating intrapersonal cognitive decline, nor can they discern whether generative AI usage actively degrades critical thinking competencies or whether individuals with lower baseline critical thinking capacity exhibit a higher propensity for technological reliance. Furthermore, applying mediation analyses to cross-sectional data fails to resolve this inherent endogeneity. Ultimately, these empirical data demonstrate that frequent AI users within this sample obtained lower critical thinking scores, rather than establishing that cognitive abilities systematically deteriorated over time—an epistemic limitation that renders this corpus not as definitive proof, but as indicative of an emergent pattern requiring rigorous longitudinal and experimental validation, as Gerlich himself concedes.

Moreover, in updating the extended mind hypothesis for the era of algorithmic systems, recent research demonstrates that these technologies not only shape the content and direction of thought but also recursively incorporate user-generated outputs into their own algorithms [78]. Contemporary debates now center on cognitive engagement, critically examining how algorithmic agency subtly preconfigures individuals' beliefs, preferences, and creative trajectories.

4.3. LMS and AI as Cognitive Architectures

Within interdisciplinary scholarship, the term "cognitive architecture" designates computational models of cognitive processes in natural and artificial agents, alongside their implementation within Artificial Intelligence [79]. This domain crystallized at the intersection of AI and cognitive science, seeking to decode the mechanics of the human mind and brain through computational modeling.

A cognitive architecture constitutes a generalized hypothesis concerning the representations and mechanisms that engender intelligence, providing interpretive toolkits for understanding human reasoning, problem-solving, memory, and learning. Learning Management Systems (LMS) and Generative AI (GenAI) systems are evolving into cognitive architectures that structurally organize, direct, and standardize the learning process, thereby conditioning the frameworks within which knowledge is constructed, appraised, and internalized. A critical ontologi-

cal divide separates human architectures from those of artificial agents. In AI, architecture is engineered to mimic a desired behavioral output, whereas purely cognitive architectures incorporate strict constraints of cognitive validity [80].

The term "cognitive architecture" is deployed in this article across two distinct registers that demand explicit conceptual integration. Within computational cognitive science and artificial intelligence, the term designates a hypothesis concerning the invariant structures and mechanisms that underpin cognition, formalized computationally and evaluated for cognitive validity. In Section 2, by contrast, the term was invoked in an institutional and material capacity to denote the spatial, artifactual, and normative arrangements—such as the blackboard, desk configurations, and the curriculum as a "system of reason"—that determine the boundary conditions of the cognitive operations a school affords.

We do not contend that a classroom constitutes a computational model of the mind. Rather, this theoretical extension rests upon a structural analogy grounded in the paradigm of distributed cognition. If cognition is fundamentally distributed across individuals, artifacts, and institutional matrices, then the structures organizing cognitive activity reside neither exclusively in the brain nor in software, but equally within the material and institutional environment. Consequently, we extend the concept to encompass any relatively stable configuration of components and rules that 1) enables, constrains, sequences, or obscures specific cognitive operations, and 2) exerts a recursive influence on the cognition of its participants. This conceptual formulation underpins the spatial metaphor introduced in Section 4.1.

These two registers diverge methodologically and epistemologically: computational architectures operate as descriptive hypotheses regarding mental mechanics, whereas the architectures examined herein are prescriptive. Rather than modeling cognition, they actively shape the cognitive dispositions of actual learners. For this reason, the criterion of cognitive validity—which governs computational applications—does not transfer directly to our framework.

Learning Management Systems (LMS) and generative AI systems represent the precise intersection where these two registers converge. Architecturally computational in their implementation, being constructed from autonomous agents, prompts, and microservices, they are simultaneously institutional in their function, as they systematically organize pedagogical labor, regimes of assessment, and structures of authority. The blackboard, by comparison, remains confined to the institutional register. This convergence elucidates how a genealogical inquiry can trace a continuous trajectory from traditional classroom technologies to advanced digital systems under a unified conceptual umbrella, while rigorously preserving the analytical distinction between them.

Historically, LMS platforms functioned as static repositories of content, disseminating educational materials via uniform models and evaluating learners on the basis of standardized assumptions regarding learning paces and trajectories. The integration of Generative AI transforms these systems into dynamic ecosystems

that require advanced reasoning and carefully balanced human-technology collaboration. Generative AI offers unparalleled adaptability, delivering content at varying paces, in flexible sequences, and through activities precisely tailored to each student's zone of proximal development [81]. Large Language Models (LLMs), which underpin predictive AI capabilities, continuously analyze performance metrics, behavioral patterns, and interaction logs to hyper-personalize content, dynamically adjust difficulty levels, and provide real-time feedback [82].

The architectural design of these systems determines the precise protocols for knowledge transmission. Proposed GenAI-LMS frameworks incorporate a suite of digital agents—including tutoring, assessment, recommendation, monitoring, and collaboration—coordinated through microservices within an adaptive, closed-loop structure. This architecture reflects a deliberate ideological stance. System-generated prompts from the LMS constrain model behavior and define strict cognitive boundaries, while user prompts initiate queries for algorithmic processing. Standardization is maintained through scripted conversational workflows, enabling educators to define AI personas, pre-structure dialogic interactions, and embed curricular content, thereby ensuring strict alignment with institutional objectives. Additionally, the system facilitates automated diagnostics, interactive dialogues, and personalized feedback, all designed to foster active engagement within predetermined pathways [83] [84].

GenAI systems orchestrate cognitive processes, making them seamless, predictable, and endlessly replicable. The influence of these architectures on human behavior is deeply reciprocal. Consistent interaction with structured AI environments reinforces established patterns of help-seeking, task execution, and uncritical compliance—a phenomenon aptly described as programmistic behavior. The organization of dialogue, along with the rhythm and tone of communication, shapes cultural interpretations of error, progress, and personal competence. In this context, large language models function as infrastructures for mediating meaning, delineating the boundaries of legitimate learning activities [85].

4.4. Creativity and Cognitive Reshaping

The rapid advancement of Large Language Models (LLMs) has reignited a longstanding scholarly debate regarding the nature of AI-generated creativity. Central to this discourse is the question of whether AI systems are capable of genuine creative acts or whether their outputs merely constitute sophisticated recombinations of pre-existing patterns. LLMs now permeate every stage of the creative process—from initial ideation and conceptualization to execution and refinement—demonstrating varying impacts depending on the specific domain and the expertise of the user. Meanwhile, theoretical frameworks for creativity support tools indicate that different digital environments enable distinct cognitive processes, spanning generative, exploratory, and evaluative modes, thereby reshaping the landscape of creative labor. Nevertheless, the intricacies of this phenomenon extend well beyond mere technological mediation [86].

At a structural level, LLMs operate by leveraging statistical models trained to predict the most probable subsequent token within vast textual corpora. These systems lack intrinsic understanding, intentionality, or volition, and their apparent stylistic and structural coherence arises from the exploitation of linguistic statistical regularities rather than genuine comprehension. As a result, critics have described LLMs as "stochastic parrots", emphasizing their reliance on probabilistic mimicry rather than authentic creative agency [87].

This distinction aligns with Margaret Boden's tripartite taxonomy of creativity: combinational creativity, which involves generating novel juxtapositions of established ideas; exploratory creativity, which entails uncovering previously uncharted structures within an existing conceptual space defined by rules and aesthetic norms; and transformational creativity, which requires the restructuring of the generative rules themselves, thereby expanding the boundaries of what is considered possible [6] [88]. The deliberate subversion of established rules forms the foundation of human creative agency and serves as the critical threshold distinguishing genuine human innovation from algorithmic pattern recombination. Empirical studies indicate that while contemporary large language models excel at combinational creativity through the rapid production of variations, they consistently struggle to achieve transformational breakthroughs that disrupt and redefine the prevailing paradigms of scientific or artistic domains [89].

The influence of these systems lies not in a simple augmentation or diminishment of creative capacity, but in the systemic reconfiguration of foundational cognitive processes. By analyzing extensive corpora of human-generated content, algorithmic models identify structural patterns and re-index information accordingly. This capability has revealed an unsettling reality: a significant proportion of conventional human writing adheres to predictable, highly formulaic structures. Comparative experimental studies examining human versus algorithmic text production demonstrate that, while LLM-generated texts often match or surpass human drafts in terms of surface-level stylistic refinement, they consistently fall short in conveying authentic authorial voice and conceptual depth, particularly when compared to the work of experienced writers [90]. These findings underscore that language models primarily operate as engines of rapid recombination, while simultaneously highlighting the extent to which human composition depends on recurring structural templates.

At the same time, algorithmic outputs frequently fulfill formal criteria for innovation, producing novel configurations that are unprecedented in their exact arrangement and are often perceived by human readers as original. However, the comprehensive mathematization of cultural production by computational systems challenges the validity of a strict binary distinction between originality and derivation in the current digital context [91].

The generative power of GenAI arises from its models' ability to map and recombine patterns within high-dimensional latent spaces. However, this pattern-based creativity is fundamentally limited in its capacity to internalize broader cul-

tural or epistemological contexts, confining its outputs to a local and fragmentary simulation of reality [92].

Within this paradigm, theoretical accounts reframe the creative process as algorithmically mediated cognitive offloading, postulating that it may attenuate attentional allocation, diminish long-term memory retrieval, and exacerbate automation bias—the systematic propensity to defer uncritically to computational outputs [93]. Concurrently, it has been hypothesized that over-reliance on external retrieval architectures degrades internal memory organization, thereby compromising the cognitive flexibility required to execute creative transitions between mental schemas [94]. Crucially, these assertions represent theoretical projections rather than empirical facts; their long-term cognitive and developmental ramifications remain a critical trajectory for future empirical inquiry.

Empirical evidence derived from experimental paradigms remains restricted to specific task conditions. In randomized controlled trials examining divergent and convergent thinking, interaction with a large language model enhanced performance during co-creativity tasks; nevertheless, a residual suppressive effect was observed on participants' subsequent unaided creative output [95]. These observations, however, remain circumscribed by the specific tasks, participant samples, and model architectures evaluated, with the temporal persistence of such effects beyond the immediate experimental session remaining unestablished. Within applied educational environments, empirical documentation is considerably more sparse. Utilizing a mixed-methods design within a single undergraduate creativity course employing the Alternative Uses Task, Habib *et al.* [96] demonstrated that students scaffolded by ChatGPT-3 achieved higher scores in fluency, flexibility, and elaboration; conversely, qualitative self-reflections revealed cognitive fixation on AI-generated suggestions, alongside observed declines in creative confidence. Given the sample's single-course restriction, these findings are best characterized as indicative rather than generalizable. Indeed, divergent outcomes are reported elsewhere, with alternative studies documenting positive effects of generative AI on creative self-efficacy across distinct task domains and demographic cohorts.

These developments prompt a significant reevaluation of the extended mind hypothesis within artificial intelligence research. Contemporary theoretical perspectives contend that algorithmic systems are not merely passive extensions of human cognition; instead, they actively shape the content, structure, and trajectory of human thought. This dynamic has led to the conceptualization of the "extracted mind"—a philosophical argument, not an empirical finding, according to which advanced AI systems may appropriate, emulate, and ultimately surpass internalized cognitive abilities. In this context, the human subject is relegated from an active co-creator to an alienated, detached overseer of automated cognitive processes [97].

In sum, the empirical and theoretical synthesis presented in Sections 4.2 and 4.4 encompasses three distinct categories: observational and correlational findings [77], task-specific experimental effects [90] [95] [96], and theoretical projections

[93] [94] [97]. This body of literature cannot be interpreted as collectively demonstrating a generalized degradation of human cognitive capacity. Nor does the thesis advanced herein depend upon the premise of such a decline. Rather, the core argument addresses how the architectural configuration of LMS and generative AI environments structurally mediates creative activity (Section 5)—a proposition anchored in the analytical examination of these digital architectures rather than the empirical magnitude of any specific cognitive offloading effect.

5. By Way of Conclusion: From Artificial Intelligence to "Autolligence" (A.L.)

The preceding sections have demonstrated that, when examined through the theoretical frameworks of the extended mind and distributed cognition, Learning Management Systems (LMS) and generative artificial intelligence converge to form cognitive architectures in which creativity is primarily expressed as remix—that is, the reconfiguration of existing materials within tightly circumscribed parameters. This analysis foregrounds a critical methodological tension in the educational technology literature. Creativity is frequently conceptualized as a quantifiable, optimizable cognitive skill, abstracted from the historical, socio-political, and material contexts that have traditionally shaped its production, definition, and assessment within educational institutions.

The very term artificial intelligence subtly presupposes an epistemological rupture—an external force introduced into education that fundamentally transforms the pedagogical landscape as if from nothing. This underlying narrative of abrupt discontinuity allows mainstream discourse to treat creativity as a decontextualized, universal competency. In response, there is a pressing need to develop a conceptual framework that challenges this narrative of rupture, instead positioning contemporary AI as part of an unbroken continuum that re-anchors creativity within its historical, political, and material foundations. This conceptual task is encapsulated in the notion of Autolligence (A.L.).

5.1. Autolligence: Constitution and Logic of the Concept

To capture this systemic condition, we advance the term autolligence (A.L.), originally introduced and thoroughly developed in earlier work by the Center for the Study and Research of the History of Education and the Teaching Profession [98]. The term should not be conflated with "automation", as the new concept, in our view, reintroduces a human-like perspective to algorithms in relation to intelligence, as demonstrated in our previous work and in this study. Automation refers to processes executed with minimal or no human intervention, representing an existential and structural condition. In contrast, the term under discussion is unrelated to "autolligism". The suffix "-ism" typically denotes a technique, process, or static state, often associated with political, ideological, or even pathological tendencies, and is frequently linked to dogmatism. Conversely, "autolligence" signifies a quality characterized by ongoing evolution and functional dynamism. It

deliberately avoids anthropomorphism and reframes the discourse, encouraging a critical examination of technological language. While this initial formulation provided a foundation for interrogating the misplaced attribution of intelligence to computational systems, the present inquiry sharpens its focus on the domain of creativity, thereby underscoring the intrinsic value of authentic human intellect in clear contrast to the automated mind.

The phrase "human-like perspective" above requires clarification, since it might appear to contradict the avoidance of anthropomorphism. Anthropomorphism attributes human mental properties (understanding, intention, creativity) to machines, and the label "artificial intelligence" does so by applying a human-capacity noun to a computational process. Autolligence attributes no such property to the system. What it retains from the human domain is the normative reference point of the analysis: the educational capacities of judgment, metacognitive control, and authorship, against which the delegation of functions to algorithmic systems is assessed. The perspective is thus human-referenced, not human-like. It asks what happens to human educational agency when these functions are delegated, while leaving the machine without human likeness.

At its most extreme theoretical and technical endpoint, the systemic drive toward automation envisions the emergence of a fully automated mind—a trajectory closely linked to ongoing debates about superintelligence, defined as systems engineered to surpass human cognitive capabilities across all conceivable domains. The historical lineage of this concept can be traced to Good's (1965) prescient hypothesis of an "intelligence explosion" precipitated by the advent of an ultra-intelligent machine, a notion further developed within the discourse on the technological singularity. In a contemporary context, Bostrom [99] characterizes superintelligence as any intellect that dramatically exceeds human cognitive performance in virtually every domain, grounding his analysis in two key propositions: first, that an agent's level of intelligence is largely independent of its ultimate goals; and second, that disparate ultimate goals tend to converge on common instrumental sub-goals, such as self-preservation [100]. Because a superintelligent entity does not inherently internalize human values, the alignment problem emerges as a central area of concern [101] [102]. Superintelligence thus serves as an analytical lens, linking the rapid advancement of technical capabilities to urgent questions of control, safety, and the broader trajectory of civilization.

Against this hyper-automated vision of cognition and creativity, A.L. posits the unassailable primacy of the human mind. The term is fundamentally descriptive and conceptual, capturing not merely an isolated software attribute, but a totalized structural condition of a system—specifically, the systemic state assumed by the educational apparatus when the underlying grammar of automation (standardization, metrication, algorithmic surveillance) becomes its default mode of operation. This conceptual pivot yields three distinct analytical advantages:

—This term frees scientific discourse from debates surrounding the machine's "intelligence", redirecting research focus toward the organizational structures of

learning facilitated by technological infrastructure.

—By defining a system-wide state, the concept facilitates the integration of artificial intelligence into a continuum with earlier educational technologies—such as blackboards and standardized textbooks—which are thereby reinterpreted as preceding iterations of the same underlying automatism.

—Conceiving automation as a systemic condition suggests that creativity, or rather remix, produced within this context should no longer be regarded as an isolated individual skill. Instead, it should be understood as an expression of a historically and politically constructed cognitive architecture of control.

Autolligence does not replace the concepts of automation, standardization, or algorithmic governance, which it presupposes. Each of them, however, captures only part of the phenomenon. Automation describes how far a process runs without human intervention, but not which cognitive functions are delegated (selecting, sequencing, evaluating, recombining) or what their delegation does to learners' metacognitive control. Standardization describes uniformity of content, procedure, and assessment, yet adaptive and generative systems fix the rules while varying their outputs. Autolligence explains how such variation arises within fixed parameters, and why it appears as remix: combinational and at most exploratory creativity, while transformational creativity, which restructures the rules themselves [6], is not exposed to the user. Algorithmic governance [103] describes the steering of institutions and populations through data and prediction, but not how that steering reaches the learner's cognition. Repeated interaction with structured AI environments reinforces habits of help-seeking and compliance, so that external control tends to become the learner's own habitual mode of cognitive control. This answers the question posed in Section 3 about where cognitive "control" comes from and whom it serves. Finally, because it names a condition of the educational system rather than a capacity of machines, autolligence links governance to a longer lineage of control technologies, from the blackboard to the LLM, which Section 5.2 develops.

5.2. Escalation, Not Rupture

The foundational premise underlying A.L. is that it does not represent a radical epistemological breakthrough, but rather a technical intensification of the longstanding mechanistic and systemic logic embedded within educational systems. The history of education substantiates this trajectory. Each successive wave of technological and organizational rationalization—from standardized textbooks to global assessment frameworks such as PISA—has served to amplify the system's capacity to monitor, categorize, and govern learning at scale [104]. The distinctiveness of contemporary A.L. lies in its unprecedented computational power, expansive data processing capabilities, and the seamless integration of digital infrastructures into the core of instructional practice [105], all of which are closely aligned with broader political agendas of data-driven governance [103].

Modern A.L. in education significantly enhances capacities for personalization,

sorting, and prediction through adaptive systems, intelligent tutoring platforms, and learning analytics. However, this evolution entails a substantial transfer of critical diagnostic, evaluative, and decision-making authority from educators to algorithmic systems [106]. It is this structural delegation that makes the concept of Autolligence analytically more robust than that of artificial intelligence, as it exposes the profound reconfiguration of pedagogical labor and institutional power relations.

From the perspective of critical pedagogy, this trajectory raises pressing questions about who determines the criteria for optimization and whether students are being systematically transformed into quantifiable performance metrics or nurtured as historically aware, critically reflective individuals capable of resisting the neoliberal corporatization of education [107]. Artificial Intelligence, in this context, represents the latest iteration of a longstanding project of rationalization—one that traces its origins to Comenian utopian ideals and now finds expression in today's micro-targeted data ecosystems.

5.3. Autolligence and De-Historicized Creativity

A critical historical genealogy of creativity provides the essential methodological bridge for transitioning to the framework of autolligence. Recognizing that creativity is neither a universal, transhistorical essence nor a neutral cognitive faculty, but rather a discursively constructed category shaped within specific pedagogical contexts, exposes the limitations of uncritical psychological analyses. Mainstream cognitive psychology lacks the conceptual apparatus necessary to address the two foundational dimensions highlighted by autolligence:

1) The historical dimension: This dimension requires a rigorous engagement with the history of education. From this perspective, modern AI emerges as the technical culmination of historical disciplinary technologies—such as the blackboard, standardized workbooks, teaching machines, and large-scale assessments like PISA—revealing its deep entanglement with longstanding educational practices and apparatuses.

2) The political dimension: Grounded in critical pedagogy as a praxical orientation, this dimension exposes autolligence as an ideologically charged technical apparatus. It embeds optimization goals, constructs subjectivities, and implements mechanisms of surveillance, all of which originate from specific institutional centers of power. This analysis foregrounds the ways in which autolligence perpetuates and intensifies existing power relations within educational systems.

Combining these two dimensions offers a theoretical framework for deciphering the complexities of remix. Contemporary artificial intelligence represents the technical apex of a long-standing trajectory of standardization and control, positioning remix as the default mode of creative expression within strictly pre-configured parameters. Consequently, the concept of autolligence situates the phenomenon of remix within a comprehensive historical and political critique.

5.4. A Critico-Praxical Approach to Artificial Learning at the University of Crete

Critico-praxical pedagogy represents a broad international philosophical and educational movement [4] [108]-[110] dedicated to restoring the historical and political dimensions of educational concepts. This approach is actively cultivated in the Postgraduate Program at the University of Crete, through the Center for the Study and Research of the History of Education and the Teaching Profession [111], where every educational concept is analyzed as both historically constructed and politically operative. Consistent with contemporary critical pedagogy, this perspective treats school knowledge as a social construct embedded within power relations, thereby reclaiming the political significance of concepts such as "critical thinking", which mainstream pedagogy often reduces to a neutral technical skill [112]. This critical lens extends to the discourse of digital education, where terms like "artificial intelligence" are not viewed as neutral descriptors but as labels that naturalize particular understandings of cognition, knowledge, and learning. From a Freirean standpoint, critical pedagogy interrogates generative AI, highlighting the risks of conflating curated information with genuine knowledge and of diminishing the role of thinking as a distinctly human activity [113] [114]. For Freire [4], the act of naming the world is a fundamental praxis, as reflection on language becomes a catalyst for transformative action upon reality.

This framework sharply delineates the philosophical divide between Mind—characterized by conscious reflection and self-awareness—and machine Logos or Computation, defined by algorithmic rule-execution and statistical processing. This conceptual distinction is rooted in John Searle's [7] influential Chinese Room thought experiment, which compellingly demonstrates that the syntactic manipulation of formal symbols is insufficient to produce genuine semantic understanding. This insight is directly applicable to contemporary Large Language Models (LLMs), which, within the analytical scope of this study, are positioned as the latest iteration—and intensification—of disciplinary technologies first exemplified by educational tools such as the blackboard. In each case, the deliberate blurring of the boundary between human intelligence and machine calculation signals a troubling prospect: the potential erosion of human autonomy if AI ceases to function as a strictly subordinate tool.

The concern that technology may disable human capacities draws theoretical support from Ivan Illich's Disabling Professions [115], where he argues that excessive technological specialization undermines individual autonomy and stifles imaginative capacity. In Tools for Conviviality [5], Illich further distinguishes between industrial tools—which foster passivity, dependency, and heteronomy—and convivial tools, which enhance personal agency and remain firmly under user control. This distinction underscores the imperative to critically assess the role of AI technologies in either enabling or constraining human flourishing.

Viewed from this perspective, the concept of autolligence serves as a rigorous analytical tool, redirecting the discourse on creativity to its proper historical, po-

litical, and material context—precisely where the international tradition of critico-praxical pedagogy, as it is also fostered at the University of Crete, has consistently situated it.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Chrisomalis, S. and Miton, H. (2025) Cognitive Technologies and Their Histories. *Topics in Cognitive Science*, **18**, 7-25. https://doi.org/10.1111/tops.70035

[2] Gallagher, S. (2013) The Socially Extended Mind. *Cognitive Systems Research*, **25**, 4-12. https://doi.org/10.1016/j.cogsys.2013.03.008

[3] Clark, A. and Chalmers, D. (1998) The Extended Mind. *Analysis*, **58**, 7-19. https://doi.org/10.1093/analys/58.1.7

[4] Freire, P. (1970) Pedagogy of the Oppressed. Herder & Herder.

[5] Illich, I. (1973) Tools for Conviviality. Equinox Publishing Ltd. https://doi.org/10.1558/isbn.9780714521602

[6] Boden, M.A. (2004) The Creative Mind: Myths and Mechanisms. 2nd Edition, Routledge

[7] Searle, J.R. (1980) Minds, Brains, and Programs. *Behavioral and Brain Sciences*, **3**, 417-424. https://doi.org/10.1017/s0140525x00005756

[8] Polenghi, S. (2024) Histories of Educational Technologies. Introducing the Cultural and Social Dimensions of Pedagogical Objects. *Paedagogica Historica*, **60**, 1-17. https://doi.org/10.1080/00309230.2023.2298337

[9] Landahl, J. (2013) The Eye of Power(-Lessness): On the Emergence of the Panoptical and Synoptical Classroom. *History of Education*, **42**, 803-821. https://doi.org/10.1080/0046760x.2013.832408

[10] von Engelhardt, K. and Wähler, J. (2024) Subject-Specific Classroom: Technologisation of the Pedagogical Space in East Germany (SBZ/GDR, 1949-1989) *Paedagogica Historica*, **60**, 121-142. https://doi.org/10.1080/00309230.2023.2293720

[11] Broecke, S.V. (2000) The Use of Visual Media in Renaissance Cosmography: The Cosmography of Peter Apian and Gemma Frisius. *Paedagogica Historica*, **36**, 130-150. https://doi.org/10.1080/0030923000360107

[12] Dussel, I. and Priem, K. (2017) The Visual in Histories of Education: A Reappraisal. *Paedagogica Historica*, **53**, 641-649. https://doi.org/10.1080/00309230.2017.1392582

[13] Grosvenor, I. and Burke, C. (2008) School. Reaktion Books.

[14] Masschelein, J. and Simons, M. (2013) In Defence of the School: A Public Issue. Education, Culture & Society Publishers.

[15] Kennedy, K.D. (2000) Visual Representation and National Identity in the Elementary Schoolbooks of Imperial Germany. *Paedagogica Historica*, **36**, 224-245. https://doi.org/10.1080/0030923000360111

[16] Cote, J. (2000) "To See Is to Know": The Pedagogy of the Colonial Exhibition, Semarang, 1914. *Paedagogica Historica*, **36**, 340-366. https://doi.org/10.1080/0030923000360115

[17] Cunningham, P. (2000) Moving Images: Propaganda Film and British Education 1940-45. *Paedagogica Historica*, **36**, 389-406.

https://doi.org/10.1080/0030923000360118

[18] Evertsson, J. (2014) Classroom Wall Charts and Biblical History: A Study of Educational Technology in Elementary Schools in Late Nineteenth- and Early Twentieth-Century Sweden. *Paedagogica Historica*, **50**, 668-684. https://doi.org/10.1080/00309230.2014.924973

[19] Kalogiannakis, P. (2021) Εκπαίδευση και κοινωνία: Μια ετεροπαιδαγωγική διαχρονική προσέγγιση [Education and Society: A Heteropedagogical Diachronic Approach]. Diadrasi.

[20] del Mar del Pozo Andrés, M. (2024) Rise, Fall, and Resurrection of Educational Technologies: The Curious Case of Decroly in Spain. *Paedagogica Historica*, **60**, 18-39. https://doi.org/10.1080/00309230.2023.2234833

[21] Bosche, A. and Geiss, M. (2025) Funding Educational Media: Public Finance and the Introduction of Audio-Visual Teaching Aids in Zurich, 1960-1990. *Paedagogica Historica*, **61**, 698-717. https://doi.org/10.1080/00309230.2025.2459167

[22] Popkewitz, T.S. (2006) Hey, Dude! It's Not the Computer. Technologies, Curriculum, and Governing the Self. In: Afolayan, M., Browne, D. and Jules, D., Eds., *Current Discourse on Education in Developing Nations*: *Essays in Honor of Robert B. Tabachnick and Robert Koehl*, Nova Science Publishers, 207-221.

[23] Popkewitz, T.S. (2008) Cosmopolitanism and the Age of School Reform: Science, Education, and Making Society by Making the Child. Routledge.

[24] Westerberg, A. (2025) Teaching Ideals and Materiality during the Establishment of the Swedish Comprehensive School 1949-1972. *Paedagogica Historica*, **61**, 955-975. https://doi.org/10.1080/00309230.2025.2492049

[25] Haydn, T. (2002) The Book versus the Screen: Educational Media in the Digital Age. *Paedagogica Historica*, **38**, 387-401. https://doi.org/10.1080/0030923020380119

[26] Jia, X., Li, W. and Cao, L. (2019) The Role of Metacognitive Components in Creative Thinking. *Frontiers in Psychology*, **10**, Article 2404. https://doi.org/10.3389/fpsyg.2019.02404

[27] Zhang, W., Sjoerds, Z. and Hommel, B. (2020) Metacontrol of Human Creativity: The Neurocognitive Mechanisms of Convergent and Divergent Thinking. *NeuroImage*, **210**, Article ID: 116572. https://doi.org/10.1016/j.neuroimage.2020.116572

[28] Beaty, R.E., Zeitlen, D.C., Baker, B.S. and Kenett, Y.N. (2021) Forward Flow and Creative Thought: Assessing Associative Cognition and Its Role in Divergent Thinking. *Thinking Skills and Creativity*, **41**, Article ID: 100859. https://doi.org/10.1016/j.tsc.2021.100859

[29] Redifer, J.L., Bae, C.L. and DeBusk-Lane, M. (2019) Implicit Theories, Working Memory, and Cognitive Load: Impacts on Creative Thinking. *Sage Open*, **9**, 1-16. https://doi.org/10.1177/2158244019835919

[30] Chan, M.M.Y., Cho, E., Lambon Ralph, M.A. and Robinson, G.A. (2025) The Cognitive and Neural Bases of Creative Thought: A Cross-Domain Systematic Review and Meta-Analysis of Transcranial Direct Current Stimulation Studies. *Neuroscience & Biobehavioral Reviews*, **175**, Article ID: 106237. https://doi.org/10.1016/j.neubiorev.2025.106237

[31] Eymann, V., Beck, A., Lachmann, T., Jaarsveld, S. and Czernochowski, D. (2024) Reconsidering Divergent and Convergent Thinking in Creativity—A Neurophysiological Index for the Convergence-Divergence Continuum. *Creativity Research Journal*, **38**, 129-136. https://doi.org/10.1080/10400419.2024.2419751

[32] Mumford, M.D., Medeiros, K.E. and Partlow, P.J. (2012) Creative Thinking: Pro-

cesses, Strategies, and Knowledge. *The Journal of Creative Behavior*, **46**, 30-47. https://doi.org/10.1002/jocb.003

[33] Pinkow, F. (2022) Creative Cognition: A Multidisciplinary and Integrative Framework of Creative Thinking. *Creativity and Innovation Management*, **32**, 472-492. https://doi.org/10.1111/caim.12541

[34] Runco, M.A. and Chand, I. (1995) Cognition and Creativity. *Educational Psychology Review*, **7**, 243-267. https://doi.org/10.1007/bf02213373

[35] Lee, C.S. and Therriault, D.J. (2013) The Cognitive Underpinnings of Creative Thought: A Latent Variable Analysis Exploring the Roles of Intelligence and Working Memory in Three Creative Thinking Processes. *Intelligence*, **41**, 306-320. https://doi.org/10.1016/j.intell.2013.04.008

[36] Skurnik, A., Ackerman, R. and Kenett, Y.N. (2025) Semantic Memory and Creative Evaluation. *BMC Psychology*, **13**, Article No. 824. https://doi.org/10.1186/s40359-025-03124-x

[37] Cortes, R.A., Weinberger, A.B., Daker, R.J. and Green, A.E. (2019) Re-Examining Prominent Measures of Divergent and Convergent Creativity. *Current Opinion in Behavioral Sciences*, **27**, 90-93. https://doi.org/10.1016/j.cobeha.2018.09.017

[38] Gerver, C.R., Griffin, J.W., Dennis, N.A. and Beaty, R.E. (2023) Memory and Creativity: A Meta-Analytic Examination of the Relationship between Memory Systems and Creative Cognition. *Psychonomic Bulletin & Review*, **30**, 2116-2154. https://doi.org/10.3758/s13423-023-02303-4

[39] Benedek, M., Jauk, E., Sommer, M., Arendasy, M. and Neubauer, A.C. (2014) Intelligence, Creativity, and Cognitive Control: The Common and Differential Involvement of Executive Functions in Intelligence and Creativity. *Intelligence*, **46**, 73-83. https://doi.org/10.1016/j.intell.2014.05.007

[40] Diamond, A. (2013) Executive Functions. *Annual Review of Psychology*, **64**, 135-168. https://doi.org/10.1146/annurev-psych-113011-143750

[41] Fischer, N.L., Kalaivanan, K., Tong, K., Uchiyama, R., W.L. Fu, P., Lee, T., et al. (2026) Set-Shifting and Task-Switching Make Differential Contributions to Divergent Thinking in Adolescence. *BMC Psychology*, **14**, Article No. 733. https://doi.org/10.1186/s40359-026-04584-5

[42] Hughes, Z.D., Ball, L.J. and Judge, J. (2026) Assessing the Role of Attentional Inhibition and Cognitive Flexibility in Convergent and Divergent Thinking during Creative Task Performance. *BMC Psychology*, **14**, Article No. 874. https://doi.org/10.1186/s40359-026-04582-7

[43] Dietrich, A. (2004) The Cognitive Neuroscience of Creativity. *Psychonomic Bulletin & Review*, **11**, 1011-1026. https://doi.org/10.3758/bf03196731

[44] Dantas de Paula, L., Branco, A. and Glaveanu, V. (2024) Thinking outside of the (Western) Box: Cultural Psychology Perspectives on Creativity in Education. *The Journal of Creative Behavior*, **59**, e655. https://doi.org/10.1002/jocb.655

[45] Rawlings, B.S. and Cutting, S.J. (2024) Linking Disparate Strands: A Critical Review of the Relationship between Creativity and Education. *Educational Psychology Review*, **36**, Article No. 135. https://doi.org/10.1007/s10648-024-09973-z

[46] Alves-Oliveira, P., Arriaga, P., Xavier, C., Hoffman, G. and Paiva, A. (2021) Creativity Landscapes: Systematic Review Spanning 70 Years of Creativity Interventions for Children. *The Journal of Creative Behavior*, **56**, 16-40. https://doi.org/10.1002/jocb.514

[47] Craft, A. (2003) The Limits to Creativity in Education: Dilemmas for the Educator.

British Journal of Educational Studies, **51**, 113-127. https://doi.org/10.1111/1467-8527.t01-1-00229

[48] Forceville, C. (2024) The Cult of Creativity: A Surprisingly Recent History. *Leonardo*, **57**, 112-114. https://doi.org/10.1162/leon_r_02481

[49] Peers, C. (2025) Amanda Weate's Genealogy of Creativity. *Journal of Aesthetic Education*, **59**, 1-15. https://doi.org/10.5406/15437809.59.3.01

[50] Glăveanu, V.P. (2018) Educating Which Creativity? *Thinking Skills and Creativity*, **27**, 25-32. https://doi.org/10.1016/j.tsc.2017.11.006

[51] Runco, M.A. (2001) Introduction to the Special Issue: Commemorating Guilford's 1950 Presidential Address. *Creativity Research Journal*, **13**, 245-245. https://doi.org/10.1207/s15326934crj1334_01

[52] Hamilton, D. (2015) The Beginning of Schooling—As We Know It? *Journal of Curriculum Studies*, **47**, 577-593. https://doi.org/10.1080/00220272.2015.1052851

[53] Qızı, D.B.M. (2025) Historical Analysis of Approaches to the Formation of Creativity in Primary Education. *International Journal of Pedagogics*, **5**, 199-203. https://doi.org/10.37547/ijp/volume05issue05-51

[54] Reese, W.J. (2001) The Origins of Progressive Education. *History of Education Quarterly*, **41**, 1-24. https://doi.org/10.1111/j.1748-5959.2001.tb00072.x

[55] Zilversmit, A. (1993) Changing Schools: Progressive Education Theory and Practice, 1930-1960. University of Chicago Press.

[56] Labaree, D.F. (2005) Progressivism, Schools and Schools of Education: An American Romance. *Paedagogica Historica*, **41**, 275-288. https://doi.org/10.1080/0030923042000335583

[57] Conner, C.J. and Bohan, C.H. (2014) The Second World War's Impact on the Progressive Educational Movement: Assessing Its Role. *The Journal of Social Studies Research*, **38**, 91-102. https://doi.org/10.1016/j.jssr.2013.10.003

[58] Lora, R. (2008) Education and the Cold War: The Battle for the American School. by Andrew Hartman. (New York: Palgrave Macmillan, 2008. X, 251 pp. $74.95, ISBN 978-0-230-60010-2.) *Journal of American History*, **95**, 908-909. https://doi.org/10.2307/27694505

[59] Adams, J. and Owens, A. (2015) Creativity and Democracy in Education: Practices and Politics of Learning. Routledge. https://doi.org/10.4324/9781315815404

[60] Cuypers, S.E. (2018) "Plowden" at 50-R.S. Peters' Response to Educational Progressivism. In: Ramaekers, S. and Hodgson, N., Eds., *Past, Present, and Future Possibilities for Philosophy and History of Education*, Springer, 101-116. https://doi.org/10.1007/978-3-319-94253-7_8

[61] Olssen, M. and Peters, M.A. (2005) Neoliberalism, Higher Education and the Knowledge Economy: From the Free Market to Knowledge Capitalism. *Journal of Education Policy*, **20**, 313-345. https://doi.org/10.1080/02680930500108718

[62] Phelps, C., Brazzolotto, M., Dechaume, M. and Lubart, T. (2025) Creative Giftedness: A Fifty-Year Retrospective Study. *Gifted Education International*, **42**, 9-32. https://doi.org/10.1177/02614294251403271

[63] Ward, S. (2013) Creativity, Freedom and the Crash: How the Concept of Creativity Was Used as a Bulwark against Communism during the Cold War, and as a Means to Reconcile Individuals to Neoliberalism Prior to the Great Recession. *Journal for Critical Education Policy Studies*, **11**, 136-155. https://www.jceps.com/wp-content/uploads/PDFs/11-3-05.pdf

[64] Gilbert, F. (2023) Review of 'Creativity in the English Curriculum: Historical Perspectives and Future Directions' Review of 'Creativity in the English Curriculum: Historical Perspectives and Future Directions' by Lorna Smith, London, Routledge, 2023, 176 Pp., £96.00 (Hardback); £19.99 (Paperback); £19.99 (e-Book), ISBN 978-1-032-15259-2. *Changing English*, **30**, 425-427. https://doi.org/10.1080/1358684x.2023.2233099

[65] Rodriguez, C. (2023) Keeping Creativity in English Education: A Review of Creativity in the English Curriculum: Historical Perspectives and Future Directions. *Journal of Adolescent & Adult Literacy*, **67**, 267-269. https://doi.org/10.1002/jaal.1320

[66] Patston, T.J., Kaufman, J.C., Cropley, A.J. and Marrone, R. (2021) What Is Creativity in Education? A Qualitative Study of International Curricula. *Journal of Advanced Academics*, **32**, 207-230. https://doi.org/10.1177/1932202x20978356

[67] Gormley, K. (2018) Neoliberalism and the Discursive Construction of 'Creativity'. *Critical Studies in Education*, **61**, 313-328. https://doi.org/10.1080/17508487.2018.1459762

[68] Heersmink, R. and Knight, S. (2018) Distributed Learning: Educating and Assessing Extended Cognitive Systems. *Philosophical Psychology*, **31**, 969-990. https://doi.org/10.1080/09515089.2018.1469122

[69] Windhager, F. and Mayr, E. (2024) Digital Humanities and Distributed Cognition: From a Lack of Theory to Its Visual Augmentation. *Journal of Cultural Analytics*, **7**, 1-34. https://doi.org/10.22148/001c.121866

[70] Hutchins, E. (2020) The Distributed Cognition Perspective on Human Interaction. In: Levinson, S.C. and Enfield, N.J., Eds., *Roots of Human Sociality*, Routledge, 375-398. https://doi.org/10.4324/9781003135517-19

[71] Cole, M. and Engeström, Y. (1993) A Cultural-Historical Approach to Distributed Cognition. In: Salomon, G., Ed., *Distributed Cognitions: Psychological and Educational Considerations*, Cambridge University Press, 1-46.

[72] Risko, E.F. and Gilbert, S.J. (2016) Cognitive Offloading. *Trends in Cognitive Sciences*, **20**, 676-688. https://doi.org/10.1016/j.tics.2016.07.002

[73] Sparrow, B., Liu, J. and Wegner, D.M. (2011) Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips. *Science*, **333**, 776-778. https://doi.org/10.1126/science.1207745

[74] Boldt, A. and Gilbert, S.J. (2019) Confidence Guides Spontaneous Cognitive Offloading. *Cognitive Research: Principles and Implications*, **4**, Article No. 45. https://doi.org/10.1186/s41235-019-0195-y

[75] Carter, J.A. (2018) Autonomy, Cognitive Offloading, and Education. *Educational Theory*, **68**, 657-673. https://doi.org/10.1111/edth.12338

[76] Shaw, S.D. and Nave, G. (2026) Thinking-Fast, Slow, and Artificial: How AI Is Re-Shaping Human Reasoning and the Rise of Cognitive Surrender. PsyArXiv. https://doi.org/10.31234/osf.io/yk25n_v1

[77] Gerlich, M. (2025) AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking. *Societies*, **15**, Article 6. https://doi.org/10.3390/soc15010006

[78] Gahrn-Andersen, R. (2026) Entangled Cognition: Algorithmic Power and the Limits of Cognitive Extension. *Journal of Cultural Cognitive Science*, **10**, 199-210. https://doi.org/10.1007/s41809-026-00202-3

[79] Lieto, A., Bhatt, M., Oltramari, A. and Vernon, D. (2018) The Role of Cognitive Architectures in General Artificial Intelligence. *Cognitive Systems Research*, **48**, 1-3.

https://doi.org/10.1016/j.cogsys.2017.08.003

[80] Kotseruba, I. and Tsotsos, J.K. (2018) 40 Years of Cognitive Architectures: Core Cognitive Abilities and Practical Applications. *Artificial Intelligence Review*, **53**, 17-94. https://doi.org/10.1007/s10462-018-9646-y

[81] Zhu, X., Magee, L. and Mischler, P. (2025) Integrating Generative AI into LMS: Reshaping Learning and Instructional Design. arXiv: 2510.18026. https://doi.org/10.48550/arxiv.2510.18026

[82] Yan, L., Pammer-Schindler, V., Mills, C., Nguyen, A. and Gašević, D. (2025) Beyond Efficiency: Empirical Insights on Generative AI's Impact on Cognition, Metacognition and Epistemic Agency in Learning. *British Journal of Educational Technology*, **56**, 1675-1685. https://doi.org/10.1111/bjet.70000

[83] Pesovski, I., Santos, R., Henriques, R. and Trajkovik, V. (2024) Generative AI for Customizable Learning Experiences. *Sustainability*, **16**, Article 3034. https://doi.org/10.3390/su16073034

[84] Ra, E., Kim, S.J., Seo, E. and So, G. (2025) Designing LMS and Instructional Strategies for Integrating Generative-Conversational AI. arXiv: 2509.00709. https://doi.org/10.48550/arxiv.2509.00709

[85] Watson, S. and Ennion, M. (2026) Programmable Support: Generative AI, Behavioural Influence, and the Mediation of Meaning in Education. *Learning, Media and Technology*. https://doi.org/10.1080/17439884.2026.2642199

[86] Ceh, S.M., Rafner, J. and Benedek, M. (2026) Creativity in Digitally Mediated Times: How Digital Tools Support Creativity across Domains. *Psychology of Aesthetics, Creativity, and the Arts*, **20**, 794-808. https://doi.org/10.1037/aca0000729

[87] Bender, E.M., Gebru, T., McMillan-Major, A. and Shmitchell, S. (2021) On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? *Proceedings of the* 2021 *ACM Conference on Fairness, Accountability, and Transparency*, 3-10 March 2021, 610-623. https://doi.org/10.1145/3442188.3445922

[88] Boden, M.A. (2009) Computer Models of Creativity. *AI Magazine*, **30**, 23-34. https://doi.org/10.1609/aimag.v30i3.2254

[89] Franceschelli, G. and Musolesi, M. (2025) On the Creativity of Large Language Models. *AI & Society*, **40**, 3785-3795. https://doi.org/10.1007/s00146-024-02127-3

[90] Chakrabarty, T., Laban, P., Agarwal, D., Muresan, S. and Wu, C. (2024) Art or Artifice? Large Language Models and the False Promise of Creativity. *Proceedings of the CHI Conference on Human Factors in Computing Systems*, Honolulu, 11-16 May 2024, 1-34. https://doi.org/10.1145/3613904.3642731

[91] Salma, Z., Hijón-Neira, R. and Pizarro, C. (2025) Designing Co-Creative Systems: Five Paradoxes in Human-AI Collaboration. *Information*, **16**, Article 909. https://doi.org/10.3390/info16100909

[92] Chutaux, C. (2026) Creativity in AI as Emergence from Domain-Limited Generative Models. arXiv: 2601.08388. https://doi.org/10.48550/arxiv.2601.08388

[93] Hooper, V.J. (2025) Cognitive Offloading and the Reshaping of Human Thought: The Subtle Influence of Artificial Intelligence. *Colloquia, Academic Journal of Culture and Thought*, **12**, 1-14. https://doi.org/10.31207/colloquia.v12i1.185

[94] Linden, K., Hachem, H. and Kondyli, V. (2025) Homo Promptus: Predicting the Impact of Generative AI on Human Memory and Creativity. *Memory, Mind & Media*, **4**, 1-20. https://doi.org/10.1017/mem.2025.10012

[95] Kumar, H., Vincentius, J., Jordan, E. and Anderson, A. (2025) Human Creativity in the Age of LLMs: Randomized Experiments on Divergent and Convergent Thinking.

Proceedings of the 2025 *CHI Conference on Human Factors in Computing Systems*, Yokohama, 26 April-1 May 2025, 1-18. https://doi.org/10.1145/3706598.3714198

[96] Habib, S., Vogel, T., Anli, X. and Thorne, E. (2024) How Does Generative Artificial Intelligence Impact Student Creativity? *Journal of Creativity*, **34**, Article ID: 100072. https://doi.org/10.1016/j.yjoc.2023.100072

[97] Loock, L. (2025) The Extracted Mind. *Synthese*, **205**, Article 133. https://doi.org/10.1007/s11229-025-04962-3

[98] Chourdakis, A. and Kounalakis, M. (2026) Demystifying Mechanical Intelligence: "Autolligence" (A.L.) and the Illusion of Artificial Intelligence (A.I.) in Contemporary Education. *SSRN Journal*.

[99] Bostrom, N. (2014) Superintelligence: Paths, Dangers, Strategies. Oxford University Press.

[100] Omohundro, S.M. (2008) The Basic AI Drives. In: Wang, P., Goertzel, B. and Franklin, S., Eds., *Proceedings of the First AGI Conference*, IOS Press, 483-492.

[101] Russell, S. (2019) Human Compatible: Artificial Intelligence and the Problem of Control. Viking.

[102] Müller, V.C. and Bostrom, N. (2016) Future Progress in Artificial Intelligence: A Survey of Expert Opinion. In: Müller, V.C., Ed., *Fundamental Issues of Artificial Intelligence*, Springer, 555-572. https://doi.org/10.1007/978-3-319-26485-1_33

[103] Williamson, B. (2017) Big Data in Education: The Digital Future of Learning, Policy and Practice. SAGE Publications Ltd. https://doi.org/10.4135/9781529714920

[104] Depaepe, M. (2012) Between Educationalization and Appropriation: Selected Writings on the History of Modern Educational Systems. Leuven University Press. https://doi.org/10.2307/j.ctt9qdwdd

[105] Meng, L. (2024) Exploration of Innovation Strategy in the Deep Integration of Information Technology and Education and Teaching. *Journal of Contemporary Educational Research*, **8**, 261-267. https://doi.org/10.26689/jcer.v8i6.7107

[106] Molenaar, I. (2022) Towards Hybrid Human-AI Learning Technologies. *European Journal of Education*, **57**, 632-645. https://doi.org/10.1111/ejed.12527

[107] Aquino, M. (2026) From Freire's Critical Pedagogy to the Age of Artificial Intelligence: Continuities, Ruptures, and New Educational Challenges. *Science Insights Education Frontiers*, **33**, 5387-5401. https://doi.org/10.15354/sief.26.re124

[108] Giroux, H.A. (2001) Theory and Resistance in Education: Towards a Pedagogy for the Opposition. Bergin & Garvey.

[109] Apple, M.W. (2000) Official Knowledge: Democratic Education in a Conservative Age. 2nd Edition, Routledge.

[110] Darder, A. (2026) Συλλογή κειμένων για της Antonia Darder για τη ζωή και το έργο της στην Κριτική Παιδαγωγική: Εκπαίδευση, τέχνη και αποαποικιακή επιτέλεση [Collection of Texts by Antonia Darder on Her Life and Work in Critical Pedagogy: Education, Art, and Decolonizing Praxis]. Diadrasi.

[111] Chourdakis, A. (2020) Critical-Praxical Pedagogy. Reflections on the Experience of the Postgraduate Program in Teacher Education of the Pedagogical Department of Primary Education of the University of Crete. *Education Sciences*, **2020**, 191-216.

[112] Kincheloe, J.L. and McLaren, P. (1994) Rethinking Critical Theory and Qualitative Research. In: Denzin, N.K. and Lincoln, Y.S., Eds., *Handbook of Qualitative Research*, Sage, 138-157.

[113] Costa, C. and Murphy, M. (2025) Generative Artificial Intelligence in Education:

(What) Are We Thinking? *Learning, Media and Technology*. https://doi.org/10.1080/17439884.2025.2518258

[114] Costa, C. and Murphy, M. (2025) Critical Education, Generative Artificial Intelligence and the Tyranny of Freedom: A Critique of Modern 'Technocracy'. *Technology, Pedagogy and Education*, **35**, 547-563. https://doi.org/10.1080/1475939x.2025.2547728

[115] Illich, I., Zola, I.K., McKnight, J., Caplan, J. and Shaiken, H. (1977) Disabling Professions. Marion Boyars.